Appendix F – An Example Scenario Using an Incident Command Tactical System

This scenario is illustrative only. It was provided by Captain Gary Wedemeyer of the Fresno, California Fire Service, and is based on the pre-plan discussion paper in Appendix C. It does not reflect an actual incident, but rather how new display concepts might be utilized in emergency response.

Displaying information received from the Incident Command Technology System

How we display the static and dynamic information that is received from the Incident Command Technology System (ICTS) is of the utmost importance. Simplicity cannot be stressed enough. The most important thing to keep in mind, is *where* this information will be viewed. In all cases, it will be on a small screen that is attached to a vehicle that will be traveling at a high rate of speed, in poor lighting, and with lots of bumps.

As in Appendix C, "static" means anything to do with a building that, for the most part, does not change and "dynamic" will refer to anything that does change within a building when an emergency occurs.

This example will walk you through the response, the arrival, and the after arrival scene. I will demonstrate with text and visual aids how I think this system could be displayed in a way that will greatly enhance the information given to those that are most critical to the overall outcome of the emergency scene -- the First Responders.

Getting this information in a timely matter is very important. Responding to an incident in a building provides a few minutes to absorb any static or dynamic information about the scene. An example of timing for most vehicles:

Initial call	No information
1 minute	Put on personal protective gear - worst time to convey building information
2 minute	Climbing into engine, being seated and belted - better
3 minutes	Using the GIS map and display to navigate and plan – is it a smart building?
4 minutes	Monitoring proper route - **best time to see additional information**
5 minutes	Arrival – initial size up; Only show assessment of the problem – no details
On scene	Start SOP (sequence of procedure??) – assessment, deploy hoses and ladders if needed

An example of timing for single rider vehicles[1].

Initial call	No information
1 minute	Into vehicle, all systems on – only time for error checking
2 - 3 minutes	Drive to scene – GIS map and simple audio is all that is available
4 minutes	Arrival – face to face and establish communication
5 minutes	Initial command set up. – **now is the best time for additional information**

High Rise Fire Scenario

For this example, we will respond to a 7 story, 24 hour care facility that has a disgruntled tenant who decides to burn the building down. It is a high rise building. He will start by shutting down the sprinkler system to the building, and then light multiple fires on the 5th floor.

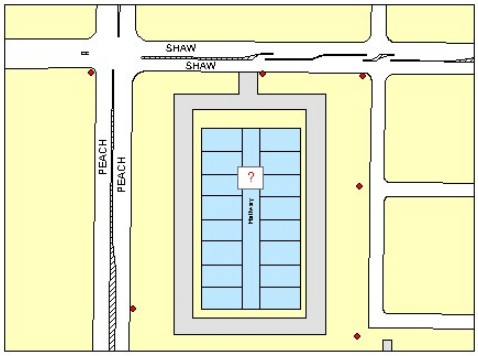
This type of call would require police, fire, and EMS to respond. The following timeline and details of the information system are given from the *perspective of the first fire engine to arrive*.

0345: Initial dispatch: Fire alarm at 1730 W Shaw. No further information.

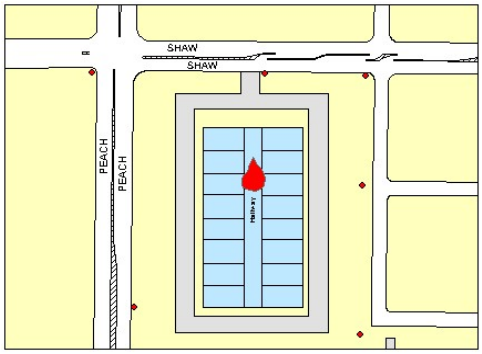
0345-0346: Crew members get to the fire engine and place their personal protective equipment on.

[1] It is always assumed that all field supervisors of both police and EMS drive alone in their cars.

0346-0347: After getting seat belts fastened, the captain informs dispatch that E1 is enroute. He then has to direct his attention on how to GET to the call. He looks at the mobile data terminal (MDT) and switches to the "map". The map is nothing more than digitized layers that are geo-referenced. In Fresno, on our map, set to be invisible, is a layer that consists of points. There is a geo-referenced point for every address location in the city. The software on our MDT searches out those points to find the one that belongs to the address we are responding to. It then places an "Event location[2]" symbol directly over that dot.



Initial display on MDT.



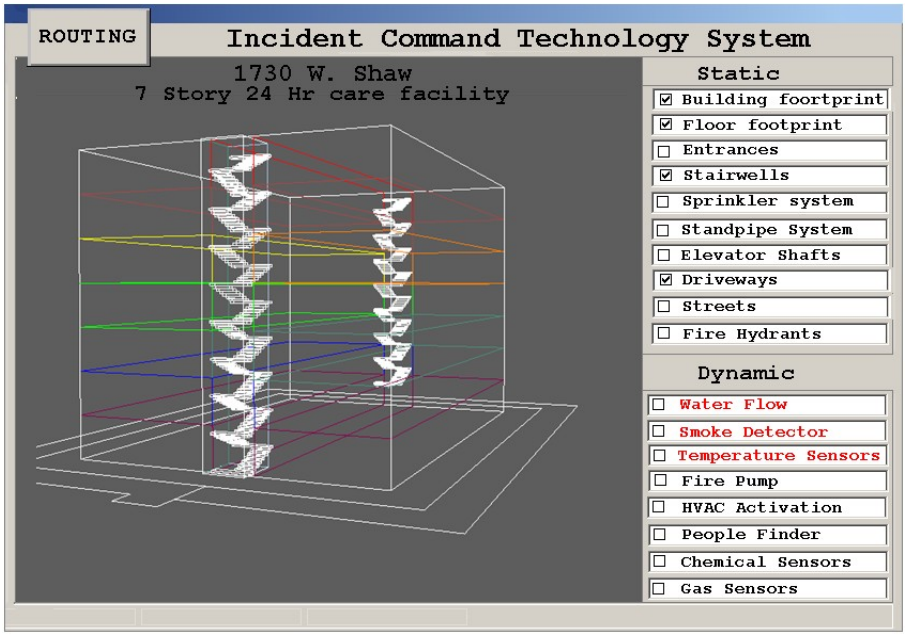
Pressing query symbol might show an issue with body fluids

In Fresno's case that symbol is a yellow triangle. In the figures above, we see what Fresno's Fire map would look like. The Building is blue, the hydrants are red dots, and the driveway is grey.

0347 Hours: Dispatch informs E1 that they are receiving phone calls from the building stating that there is someone inside the building screaming and setting fires. This means dispatch would automatically start a full alarm to the site. They would also get Police and EMS dispatched as well.

0347-0350 hours: Upon looking at the map, the captain sees that the Event locator symbol is a white square with a question mark in it. He knows this means they are responding to an ICTS smart building.

Selecting the white rectangle brings up further information as seen in the following figure[3]:



[2] An event location symbol signifies that additional information is available – see text for suggested icons
[3] Color coding: red is used to indicate dynamic data which has changed from the initial value (level).

Notes on using the MDT

When additional information is available, it needs to be VERY easy to access. Another critical aspect that will need to be worked into the system is the ability to get back to the "Routing" map that they will be using to get to the scene. Note the ROUTING button and its prominent display.

During these two minutes that the Captain has to look up any additional info on the building, he still has to guide his driver to the scene. There are many times when traffic, or trains, or even the driver missing a turn, make it necessary to adjust the route, and that requires IMMEDIATE access to the routing software. This cannot be stressed enough. If the system does not get back to the routing easily, it will not be used.

It is assumed that the additional information can be found by simply clicking on the "Event locator symbol"-- the white box, located on the routing portion of the software. This will launch into a display that will have three sections. A 3D picture of the building in question that can be grabbed and moved and rotated, a drop-down window that will have a list of all STATIC layers available for this building, and a drop-down list of all DYNAMIC layers to the building.

0347 Hours: The Captain on Engine one notices that the Event locator symbol on his routing map is a white square. He clicks on this white square, and that causes his MDT to launch into the software that will display the additional information from the ICTS.

Notes on using the MDT event locator

As you look at the 3D portion, remember that you will be able to grab this model and rotate it in all directions. Even as a 2D picture, it is still quite easy to see what type building we have.

This is an example of the opening screen to the ICTS. As can be seen, on the right hand side are lists of Static and Dynamic sections of the building. The software can be set to automatically display a minimum amount of info initially. Depending on who is using the MDT (EMS, PD, FD) you can tailor the initial screen to their needs.

If the individual using the MDT wants to see more of the Static or Dynamic info, it is only necessary to place a checkmark in the box next to that item, and it will appear. Displaying the info in this manner gives the user the ability to look at as MUCH or as LITTLE as needed, without overloading the screen.

NOTE: The items in red in the "Dynamic" section. They are red because something has changed in the building and put these systems in alarm. Just by turning red, they already begin to paint a picture.

Notes on the initial display:

Note the large black text on the 3D picture itself that gives an address and a very brief Building type description. It doesn't necessarily need to be on the 3D portion, but it needs to be somewhere on the screen in big font--- Address and a BRIEF description.

As a first responder, just looking at this initial screen gives me a wealth of knowledge without making anything else visible. I know the address. I know how big the building is. I know what systems are in alarm. I know how many stairwells there are to get in. Showing an elevator bank would be good on this initial screen as well. A North direction arrow would also be good.

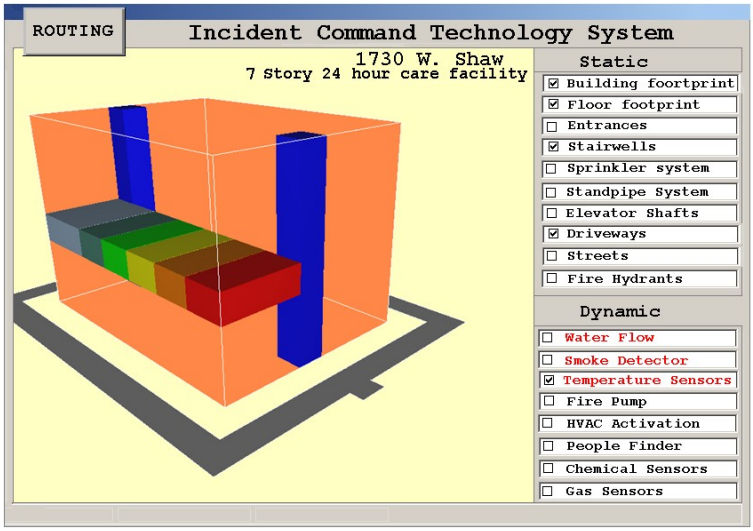
0347-0348 Hours: After looking at the additional initial information, the Captain decides to look at some of the other layers of info available while enroute. In this case, he is going to look at some of the dynamic info that has been highlighted in red.

Notes on layers

As can be seen by the display I made up here, you simply place a checkmark in the box next to the info you want to see.

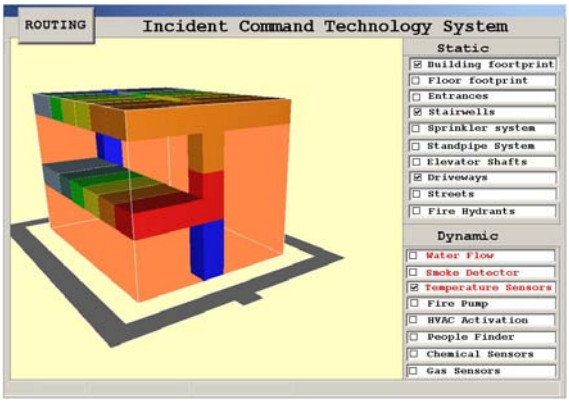
Note: most displays do NOT have a mouse. We will be doing all screen manipulation with fingers. Please make the field that activates that checkmark LARGE. In this case, if I touch anywhere within the box that has the text for that layer, it will turn it on or off.

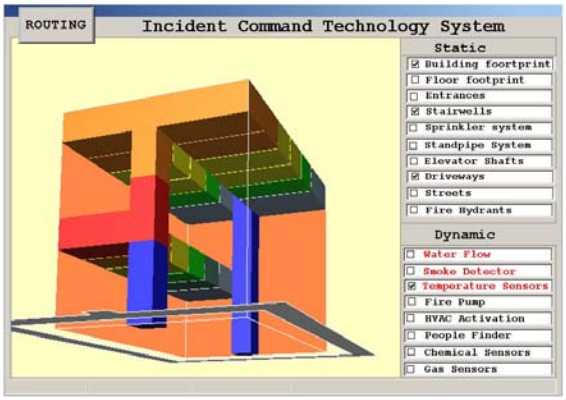
The display below shows what the Heat sensors could look like on the screen. Each heat sensor would be responsible for a block of that building, and it would color code that block to reflect the amount of heat in it. Rather than just giving me text that says " Heat sensor on the 5th floor reads 897 degrees", show me the info in color coded blocks of the building.



A nice thing to add here would be text that attaches to these heated blocks that ONLY tells me the floor that they are on. If Red is hot, it is very easy for me to see where this fire started.

Here we have rotated the display around to get a look at all sides. ONLY the Heat sensing Blocks that register ABNORMAL heat will display. As we refresh this view, we can see that the fire has breached one stairwell and spread heat and possibly fire to the top floor.

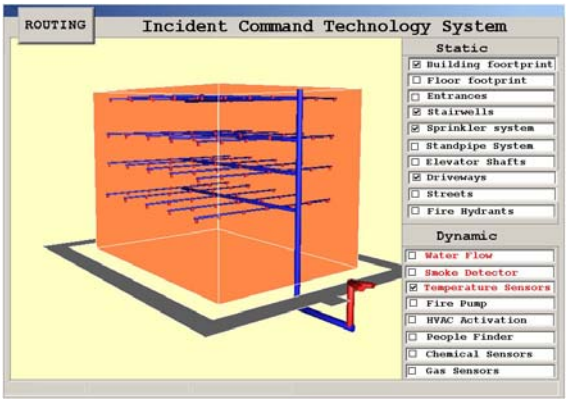




As is stands now many departments, when only a fire alarm from a building is received, send a single engine to check it out. Upon arrival, if there is fire or smoke, dispatch is called to bump up the alarm to a "Full Response." That simply means, get all the fire apparatus rolling that would have been dispatched if it had been reported as an actual fire. Having active building data would preclude this step, saving a great deal of time.

There are many advantages to this ICTS system when it becomes reliable. If this info is transferred wirelessly to our rigs, and to our dispatch center, I can see it changing how the initial response would be. If the personnel at dispatch saw this picture, they would start a full alarm response from the beginning.

Furthermore, I, as the first in captain could initiate a 2nd or 3rd alarm on this fire, just based on what the ICTS has shown me PRIOR to my arrival. Getting the right amount of resources to an emergency as quickly as possible is one of the most crucial aspects to successfully dealing with an emergency.

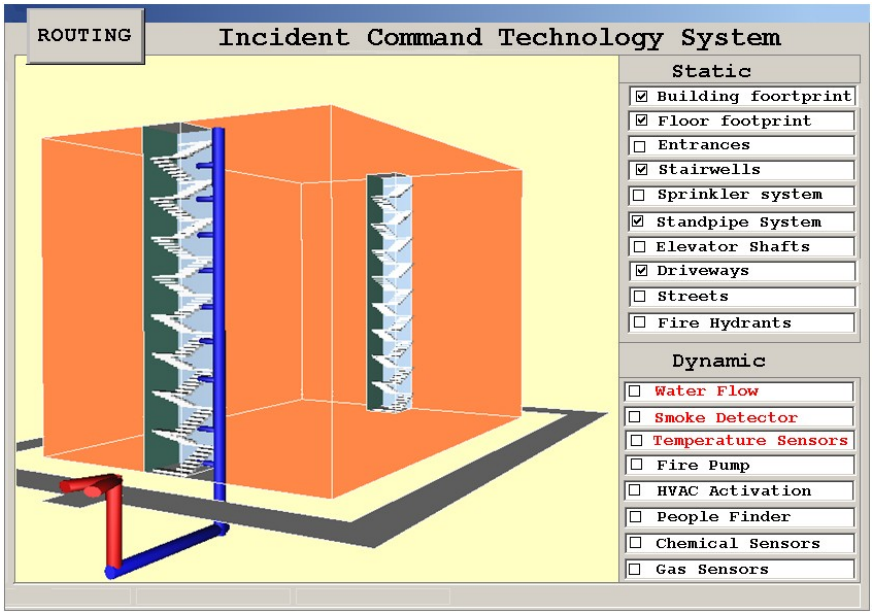


3D view of the building sprinkler system (piping)

0348-0349 Hours: The Captain decides to look at other information. In this case, he wants to see what fire suppression systems are available to deal with the fire. The piping diagram displays the sprinkler distribution system.

Notes on building displays, thermal imaging and video on scene

Standpipe: Here we have a display of the stand-pipe connection and which stairwell it supports.



It does clearly show which stairwell it supplies, where the hook-up is, and which floors it goes to.

Cameras and thermal imaging: Seeing a thermal image, or seeing an actual camera view is only half the battle. Law enforcement will use cameras in their situations as a tremendous tool. In fact their ICTS system ought to be designed around that for them.

However, as far as the fire department is concerned, there could be a more useful display of this type information. If it is a fire we are talking about, then there are two basic pieces of knowledge that are needed: where the fire is, and where the people are that need to be rescued.

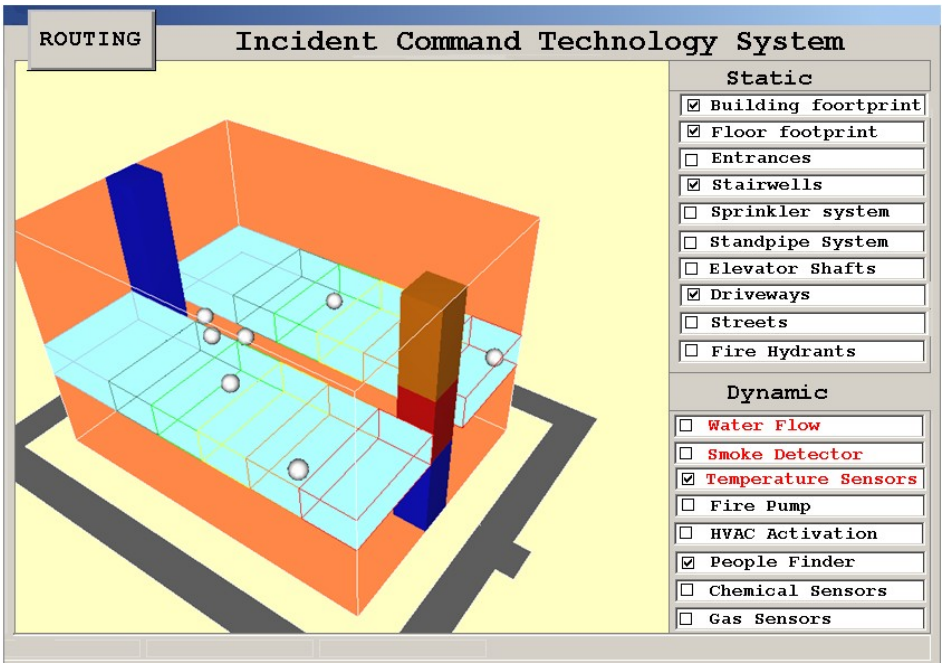
The heat sensors, smoke detectors, and water flow sensors can pretty much tell us where the fire is. A camera on the fire floor or any floor with smoke in it, will be useless. A thermal imager would be nice, but, keep in mind that a thermal imager, on the fire floor, will most likely show solid white because it will be at the ceiling level where all the heat will be.

Even if one assumes that this smart building will have thermal imagers in every room , and hallway, and stairwell in the building, it would be necessary to tap into each individual imager to see what was where and be certain of the area you are looking at.

Occupant location: If there were technology to locate occupants as well as responders, then one could use the technology today to make "people finders", for lack of a better term. It could combine info from thermal and heat sensors to identify heat signatures that most likely are that of a human. Then there would be an icon placed on the MDT's 3D image to show where this body is.

No matter what type of imager or sensor, whether it is heat, gas, or chemical, the best way to display what it sees would be in blocks of the 3D building. If the ICTS senses chemicals, don't just provide text. Use the 3D image to show ONLY the blocks of the building that are affected, and then attach text to describe what it has found.

0349-0350 Hours: After looking at the various layers of the ICTS system, the captain decides to take a quick look at the "People Finder" before arrival.



This can gives a quick visual on whether or not there are victims that need to be rescued and where they are.

Notes on the MDT

One could take this a step further, and place a red dot on the floor to show where all firefighters are, because they will be wearing personal locators that the ICTS system can track. The white dots are victims and the red dots (not shown) are first responders.

Viewing data such as this, or any other moving variable, whether it is heat, gas, chemical, or people, if you display it in this 3D manner it becomes easier for us to use. If we did go this route, we would need to be able to look at it on a floor by floor basis. When I click on people finder, a drop down menu can pop up and ask which floor I want, or it can show me all at once if I so desire. This would be true for any other sensor as well.

Whether I was searching for victims, or law enforcement was searching for a criminal moving through a building, this type of picture for what the imagers are finding would be of great value. It would also prevent the need to tap into NUMEROUS cameras and imagers. (Please see the notes on HIPPA and privacy in the workshop summary.)

0350 Hours:

Engine One arrives. The Captain is immediately approached by numerous people. Some are relatives of victims inside the building, some are uninvolved pedestrians , and some may be building officials from whom we need to get critical information.

There will be very little access of the ICTS by the first on scene unit after they arrive.

Examples of chaos on scene

Police: First unit on scene to a domestic disturbance, guns involved, fifth floor. Does this PD officer have time to sit in the front seat after arrival and check the ICTS?

EMS: First unit on scene to a domestic disturbance, guns involved, two gunshot victims, one of which is now a police officer on the fifth floor. Does this Paramedic have time after arrival to look at info on the ICTS?

Field supervisors show up after the first responders have been there for several minutes. They are tasked with setting up a permanent Incident Command Post. They have time to look at additional info on the ICTS system AFTER arrival.

By giving first responders the capability to turn on and off layers of information, there is access to as much or as little information as wanted. If the ICTS is to be of any value to the first arriving unit, it needs to be available to that unit so they can look at it prior to arrival. And the information transfer needs to be appropriate to the responder, either audio or graphic.

Making it a system that can be used by multi-jurisdictions

This is a difficult issue to solve. Different jurisdictions find different GIS solutions. These do not work with each other in many cases. When an ICTS is going to be of the most value to us is when the big disaster hits. And when the big disaster hits, there will be multiple agencies present. I know that it is not likely that we can achieve national regulations specifying that ALL Fire, Police, and EMS shall use the same software company to design its GIS, ICTS compatible system.. However, perhaps you could entertain the thought of regulating the format that all these various companies produce their digitized geographical coverage's, so that they at least would be compatible on any MDT in the nation, regardless of who built the MDT, or wrote the software that runs computer aided dispatch or automatic vehicle location on the respective MDT.

In other words, If Fresno City builds a layer that shows 3D images of buildings in its jurisdiction, using ESRI software, an engine responding from Clovis City should be able to display that same digital picture on its MDT that uses software designed by FirePro. It certainly would be nice if a fire engine or police unit responding out of jurisdiction had access to all the GIS and ICTS data from that jurisdiction. Perhaps once that unit falls under the umbrella of the new jurisdiction, the ICTS and GIS info would be sent to the MDT.